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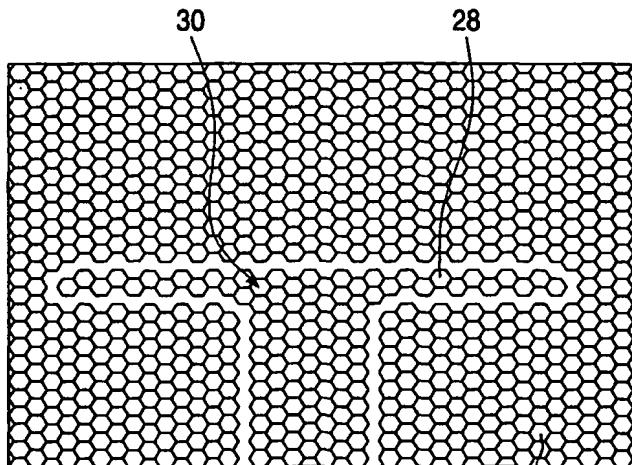
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(54) Title: A SEMICONDUCTOR DEVICE WITH SENSE STRUCTURE



(57) Abstract: A power semiconductor device is described with a plurality of cells divided into power cells (14) and sense cells (16). A plurality of groups (30, 32) of sense cells (16) are provided. The device allows for compensation of effects caused at the edges of the groups of sense cells (16).

INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H01L29/78 H03K17/082 //H01L23/495

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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 433 386 B1 (YUN C-M) 13 August 2002 (2002-08-13)	1,3
Y	column 4, line 7 - line 39; figures 2,3	4,5
A	---	6
Y	PATENT ABSTRACTS OF JAPAN vol. 1996, no. 06, 28 June 1996 (1996-06-28) -& JP 08 046193 A (TOSHIBA CORP), 16 February 1996 (1996-02-16) abstract; figures 1-4,6,8-12	4
A	---	1,3,6
	-/-	

 Further documents are listed in the continuation of box C. Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
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Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer Morvan, D

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International Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	YUVARAJAN S ET AL: "POWER CONVERSION AND CONTROL USING A CURRENT SENSING POWER MOSFET" PROCEEDINGS OF THE MIDWEST SYMPOSIUM ON CIRCUITS AND SYSTEMS, MONTEREY, CA, USA, vol. 1 SYMP. 34, 14 - 17 May 1991, pages 166-169, XP000314907 IEEE, NEW YORK, NY, USA page 166, paragraph 2; figure 1	5
A	---	1,3,6
A	US 4 931 844 A (ZOMMER N) 5 June 1990 (1990-06-05) column 3, line 10 -column 5, line 13; figures 1-6	1,3,6
A	WO 96 12346 A (PHILIPS ELECTRONICS NV ET AL) 25 April 1996 (1996-04-25) cited in the application page 6, line 29 -page 7, line 22; figure 1 page 19, line 30 -page 21, line 12; figure 6	1,3,6

INTERNATIONAL SEARCH REPORT

International Application No.
PCT/03/04080

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
US 6433386	B1	13-08-2002	KR DE FR	251528 B1 19823140 A1 2769988 A1		15-04-2000 29-04-1999 23-04-1999
JP 08046193	A	16-02-1996	JP	3338185 B2		28-10-2002
US 4931844	A	05-06-1990	JP WO	3504300 T 8908928 A1		19-09-1991 21-09-1989
WO 9612346	A	25-04-1996	DE DE EP WO JP US	69506520 D1 69506520 T2 0733283 A1 9612346 A2 9507369 T 5801573 A		21-01-1999 24-06-1999 25-09-1996 25-04-1996 22-07-1997 01-09-1998